Name:

Quiz 3 (20 points)

You must show all of your work!

1. Let \( f(x) = x \cos(x) \). Write an expression for \( f'(3) \). DO NOT EVALUATE. (3 pts)

2. Let \( g(x) \) be the piecewise function defined by

\[
g(x) = \begin{cases} 
  x^2 - s & : x < 4 \\
  t & : x = 4 \\
  3x + 1 & : x > 4 
\end{cases}
\]

Find \( s \) and \( t \) such that \( g(x) \) is continuous. (7 pts)
3. Ron Jeremy and Ron Paul are running a 20 meter three-legged race. The distance they have run (in meters) is a function, $s(t)$ of the time $t$ (in seconds) since the beginning of the race. Below is a table of certain values of $s(t)$. (13 pts)

<table>
<thead>
<tr>
<th>$t$ (seconds)</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>$s(t)$ (meters)</td>
<td>0</td>
<td>1.1</td>
<td>2.7</td>
<td>4.9</td>
<td>8.7</td>
<td>14.1</td>
<td>20</td>
</tr>
</tbody>
</table>

a) Is $s(t)$ concave up or concave down? What does this mean in practical terms? (4 pts)

b) Estimate $s'(4)$. Include units. What does this mean in practical terms? (6 pts)